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- (71) Applicant (for FR only): SERVICES PETROLIERS SCHLUMBERGER [FR/FR]; 42, rue Saint Dominique, F-75007 Paris Cedex (FR).
- (71) Applicant (for AT, AZ, DE, DK, IT, KP, KR, KZ, NO, NZ, PL, RO, RU, TM, UA, ZA only): SCHLUMBERGER

**TECHNOLOGY B.V.** [NL/NL]; Parkstraat 83-89, NL-2514 JG The Hague (NL).

- (71) Applicant (for GB, JP, NL only): SCHLUMBERGER HOLDINGS LIMITED; P.O. Box 71, Craigmuir Chambers, Road Town, Tortola (VG).
- (71) Applicant (for CA only): SCHLUMBERGER CANADA LIMITED [CA/CA]; 525-3rd Avenue S.W., Calgary, Alberta T2P 0G4 (CA).
- (71) Applicant (for all designated States except AT, AZ, CA, DE, DK, FR, GB, IT, JP, KP, KR, KZ, NL, NO, NZ, PL, RO, RU, TM, UA, US, ZA): SOFITECH N.V. [BE/BE]; Rue de Stalle 140, B-1180 Brussels (BE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): GUIBERT, Karine [FR/FR]; 11, quai Branly, 75007 Paris (FR). LOIZZO, Matteo [IT/IT]; Schlumberger Italiana S.p.A., Strada 7, Palazzo T1, Milanofiori, I-20089 Rozzano (IT).

[Continued on next page]

### (54) Title: METHOD FOR CEMENT BOND EVALUATION IN BOREHOLES

START Determine 500 Attenuations Determine extreme Coupling Amplitudes Perform - 502 acoustic measurements 503 Compute A(E) 504 Compute ΕO Invert Equations 505 (3),(5) and (6) END

(57) Abstract: A method for determining components of a tube casing surrounding a tube uses amplitude measurements of an acoustic signal wavefront emitted inside the tube. The acoustic signal wavefront is affected by the components of the tube casing while propagating in the tube. Various parameters such as an attenuation A(E) of the amplitude inside the tube and a coupling amplitude  $E_o$  may be determined. Theses parameters may be inserted in equations that are inverted to obtain a percentage of cement bonded  $\emptyset_C$  in the tube casing, a percentage of cement de-bonded  $\emptyset_D$  in the tube casing and a percentage of liquid  $\emptyset_W$  in the tube casing.

- SCHOEPF, Virginie [FR/FR]; 12, avenue Leon Gambetta, F-92120 Montrouge (FR).
- (74) Agent: MENES, Catherine; Etudes & Productions Schlumberger, 1, rue Henri Becquerel, Boîte postale 202, F-92142 Clamart Cedex (FR).
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